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# PATENT SPECIFICATION

1,045,948

DRAWINGS ATTACHED.

Inventor:—WILLIAM PERCY NAPIER.

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Index at Acceptance:—F4 S(8, 10B); F2 G(9K, 9L).

Int Cl.:—F 25 h //F 06 1.

## COMPLETE SPECIFICATION

### Motor Vehicle Radiators.

We, FORD MOTOR COMPANY LIMITED, of 88 Regent Street London, W.1, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to motor vehicle radiators.

The header and base tanks of radiators are at present made of brass. These tanks are expensive to manufacture.

A motor vehicle radiator according to this invention has an end tank preferably a header tank, another end tank, preferably a base tank, and water tubes interconnecting the tanks, and one at least of the tanks is made of a plastics material; and the water tubes are bonded in apertures in the tank made of a plastics material.

A header or base tank made of plastics material is, owing to reduced manufacturing costs, considerably cheaper than conventional tanks, and, surprisingly, it has been discovered that such tanks are satisfactory in use.

Preferably, the water tubes are bonded in apertures in the header and base tanks.

The invention is hereinafter particularly described with reference to the accompanying drawings in which:

Fig. 1 is an elevation, partly in section, of a header tank of a motor vehicle radiator.

Fig. 2 is an elevation, partly in section, of a base tank of a motor vehicle radiator; and

Fig. 3 is a section through part of a header tank and a base tank.

The radiator shown in the drawings is conventional in function, and comprises a header tank 1 (Fig. 1), a base tank 3 (Fig. 2), and water tubes 5 interconnecting the base

and header tanks: in the drawings only part of two of the water tubes is shown. The header tank has a water inlet 7 from the water jacket in the cylinder block of an internal combustion engine and a filler spout 9 closed by a conventional filler cap 11. The base tank (Fig. 2) has a drain opening 13 into which, in use, a tap (not shown) is screwed and a water outlet 15 to the water jacket in the cylinder block.

The header and base tanks 1 and 3 however differ from conventional tanks in conventional radiators in that they are made of a glass reinforced plastics material. A particularly suitable kind of plastics material has the following composition:

	%	
Atlac L382—13	34.335 by weight	
Di-tertiary butyl hydro-quinone	0.010 " "	60
Benzoyl peroxide	0.103 " "	
Tertiary butyl perbenzoate	0.342 " "	
Aluminium stearate	1.710 " "	
Surfex	28.500 " "	65
$\frac{1}{4}$ "HSI glass (855 binder)	35.000 " "	

Atlac (Registered Trade Mark) L382—13 is sold in this country by Honeywill Atlas Ltd. Surfex (Registered Trade Mark) is a special coated calcium carbonate manufactured by the Diamond Alkali Chemical Corporation, whose British Agents are Kingsley and Keith Limited. The  $\frac{1}{4}$ "HSI glass with 855 binder resin is a product of the Owens Corning Corporation.

The header tank 1 and base tank 3 are each made in two parts 17 and 19. The part 19 has a tongue 21 while the part 17 has a groove 22 (Fig. 3). Before the parts 17 and 19 are assembled they are lightly sandblasted

[Prior

to remove grease and to provide a key for the adhesive. They are then bonded together by an epoxy resin adhesive incorporating a Versamid hardener: such adhesives are made by the Shell Chemical Company and by Ciba ARL Limited.

The parts 17 and 19 are dough-moulded and the following moulding conditions were found to be satisfactory.

10	Pressure	2000 lbs per sq in.
	Temperature	300—310°F
	Cycle time	2 minutes

The moulding pressure is critical if maximum densification of the part is to be obtained.

15 The mould was closed at a fast speed in 5 seconds to  $\frac{1}{8}$ " off its stops, then slowly closed for 112 seconds, and kept fully closed for 3 seconds.

20 The header tank spout 9 is made as a separate moulding which is bonded as described above to the header tank. The inlet 7 is formed partly by a semi-cylindrical portion in the part 17 and partly by a semi-cylindrical portion in the part 19.

25 An apertured insert 25 is bonded around the drain opening 13 in the base tank and has a threaded internal surface into which the drain top (not shown) screws. The outlet 15, like the inlet 7 in the header tank, is formed partly in the part 17 and partly in the part 19 of the base tank. Bosses (only two of which are shown) are moulded integrally with the base tank and have threaded holes. Brackets for securing the base tank to the body of the vehicle are attached to the base tank by bolts 29 which screw into the holes in the bosses.

30 The water tubes 5 are conventional and fins (not shown) of serpentine shape are located between each pair of tubes. The lower part 19 of the header tank and the upper part 17 of the base tank have tapered apertures in which the ends of the tubes

make a tight fit. The ends of the tubes are then secured to the tanks by an epoxy type adhesive which also forms a seal for the apertures in the tanks. 45

Part of the advantage of this invention is obtained if only one of the tanks is made of a plastics material. If desired the header tank may be separate from the water tubes and base tank, and in this case it is connected to a chamber, which may of course be made of plastics material as described above, at the upper ends of the tubes. 50 55

#### WHAT WE CLAIM IS:—

1. A motor vehicle radiator which has an end tank, another end tank and water tubes interconnecting the tanks and in which one at least of the tanks is made of a plastics material, and the water tubes are bonded in apertures in the tank made of a plastics material. 60

2. A radiator according to claim 1 in which one end tank is a header tank, and the other end tank is a base tank. 65

3. A radiator according to claim 1 or claim 2 in which both the tanks are made of a plastics material.

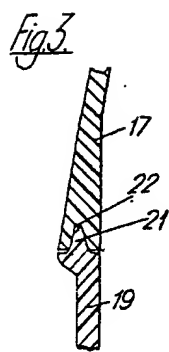
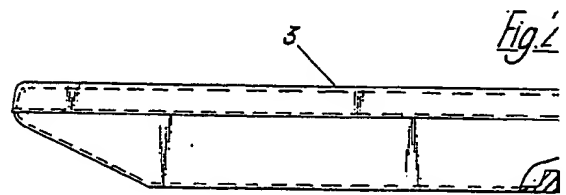
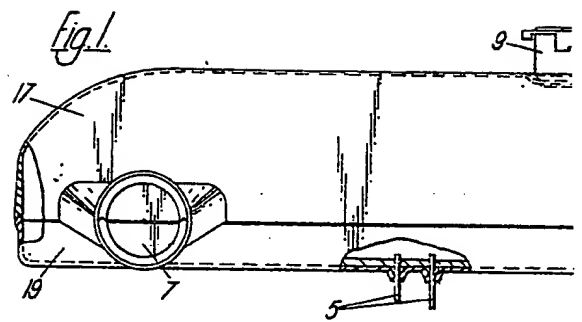
4. A radiator according to claim 3 in which the water tubes are bonded in apertures in both the tanks. 70

5. A radiator according to claim 3 or claim 4 in which the tank or tanks have tapered apertures into which the ends of the tubes fit. 75

6. A radiator according to any of the preceding claims in which the tank or tanks is formed or are formed in two parts, and the parts are bonded together. 80

7. A motor vehicle radiator substantially as hereinbefore particularly described and as shown in the accompanying drawings.

M. C. DOBBS,  
Chartered Patent Agent.

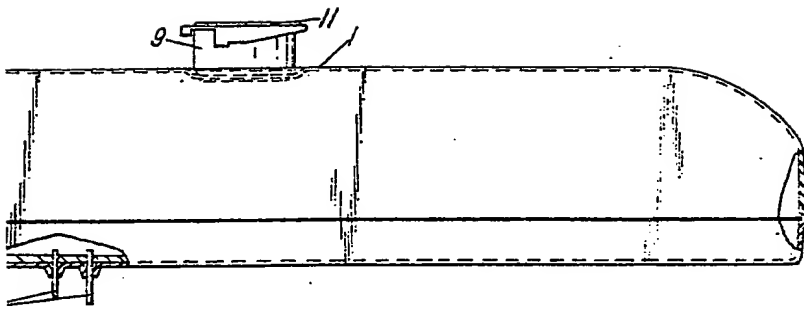


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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*



*Fig. 2.*

